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(54) Title: AUTOMATIC SUCKLING APPARATUS

(57) Abstract: The present invention relates to automatic suckling apparatus of a milk bottle for an infant, in particular on putting powdered milk, a nutrient and hot-water and the like into a milk bottle to nurse an infant, provides convenience, rapid and effective feeding from being suckled rapidly and automatically using automatic suckling apparatus, which comprises a powdered milk barrel (210), a nutrient barrel (230) and water barrel (300) contained within case (301); a device emitting powdered milk (222) placed on the below the powdered milk bottle which supplies a powdered milk within the powdered milk barrel (210) into milk bottle (100); a mobile device of milk bottle which shuttles milk bottle; a control panel including a device controlling the device emitting powdered milk, supplying of cold and hot water, amount of powdered milk/amount of water and the like.

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AUTOMATIC SUCKLING APPARATUS

Technical Field

The present invention relates to an automatic milk preparing apparatus.
5 More particularly, the present invention is directed to an automatic milk preparing apparatus for mixing powdered milk and nutrients into water so as to bottle-feed an infant in a convenient, rapid and effective manner.

Background Art

10 In general, in making a bottle of milk so as to bottle-feed an infant, powdered milk is mixed with hot water manually. Furthermore, it is difficult to get a precise mixture ratio between them.

Even a parent skilled in baby sitting feels inconvenient when a baby begins to fret severely, even if it is not a long time, or when it is needed to
15 feed a baby in a regular or irregular time at midnight for sleeping.

Meanwhile, an amount of water is essential to feed the baby with milk. If an automatic milk preparing apparatus contains insufficient water in the water tank, the water flows unevenly into a milk bottle due to the variance of water pressure. Therefore, this results in uneven quantity of water in the
20 milk bottle.

To solve these disadvantages, the applicant has proposed "*Automatic Milk Preparing Apparatus for Bottle-Feeding Infants and Controller Thereof*" filed on October 10, 1996 and granted as patent, in which the apparatus makes a use of a microprocessor, a material discharging means, a rotation disc, a
25 slide plate and the like.

Disclosure of the Invention

Therefore, the present invention has made an improvement on the prior application, and it is an object of the present invention to provide an
30 automatic milk preparing apparatus for bottle-feeding infants which employs

an effective milk discharging policy, a specific water discharging policy and a construction for sterilizing and disinfecting a milk bottle, and thereby providing the exact amount of feeding to the infants in a short time, minimizing a time loss for making the bottle feeding.

5 According to an aspect of the invention to achieve the above object, it is to provide an automatic milk preparing apparatus comprising: a powdered milk container, a nutrient container and a water tank housed in a case; powdered milk discharging means placed under the powdered milk container for supplying the powdered milk contained in the powdered milk container to
10 a milk bottle into a given amount; milk bottle transfer means for reciprocating the milk bottle; and a controller for controlling the powdered milk discharging means, and regulating supply of cold/hot water, the amount of the powdered milk/water and the like.

15 It is characterized that the powdered milk discharging means controls an amount of powdered milk so that the powdered milk is provided to the milk bottle when a rotation spoon is rotated in a clockwise or counterclockwise direction about a rotation axle to reciprocate a transferring tip which is engaged to the rotation axle on the side opposite to the rotation spoon.

20 It is characterized that a variant of the powdered milk discharging means comprises a vibrator for vibrating the powdered milk container; and a solenoid valve for controlling the powdered milk removed from the powdered milk container by the vibrator to drop into the milk bottle in a given amount.

25 Further, it is characterized that the powdered milk discharging means comprises; at least one spoon for rotating about an rotation axle to receive the powdered milk dropping from the powdered milk container; a blocking section for blocking to prevent the powdered milk from dropping downward the powdered milk container; a discharging section for dropping the powdered milk contained in the spoon downwards when the spoon is placed under the
30 blocking section.

Brief Description of the Drawings

The foregoing and other objects, features and advantages of the present invention will be more apparent from the follow detailed description when taken in conjunction with the accompanying drawings in which:

5 Fig. 1 is a general schematic view of automatic milk preparing apparatus and its control panel according to the present invention;

Fig. 2 is a side sectional view of an automatic milk preparing apparatus according to the present invention;

10 Fig. 3 is a sectional view of a transferring section of a milk bottle shown in Fig. 2;

Figs. 4a to 4c are side sectional views and an elevated view of a means for discharging milk from an automatic milk preparing apparatus; and

Fig. 5 is a side sectional view of a water tank of an automatic milk preparing apparatus.

15

Best Mode for Carrying Out the Invention

Hereinafter, a preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings.

20 Fig. 1 is a general schematic view of a control panel of an automatic milk preparing apparatus according to the present invention, Fig. 2 is a side sectional view of an automatic milk preparing apparatus according to the present invention, Fig. 3 is a sectional view of a transferring section of a milk bottle shown in Fig. 2, Figs. 4a to 4c are side sectional views and an elevated view of a means for discharging milk from an automatic milk preparing
25 apparatus, and Fig. 5 is a side sectional view of a water tank of an automatic milk preparing apparatus.

Referring to Fig. 1, an automatic milk preparing apparatus is provided with a control panel in the upper portion.

30 This automatic milk preparing apparatus is designed to allow either parent or another caregiver to manipulate the control panel in a simple manner

for providing hot liquid milk to an infant on time. First, buttons 15 and 16 of the control panel are pushed down to determine the amount of water and powdered milk inputted into a milk bottle 100.

In order to cancel the determined amount of water and powdered milk,
5 a button 80 is pushed down.

In addition, a button 60 is pushed down for adding at least one nutrient, a button 70 is pushed for an alternative supply of cold or hot water. If the button 70 is pushed down once, it is selected for cold water. If the button 70 is pushed down once again, it is selected for hot water. In
10 particular, when the button 70 is selected for hot water, a lamp 20 is turned on for announcing a supply of hot water. When the milk bottle is absent from the position for receiving water, a lamp 50 is turned on for announcing the absence of the bottle. For sterilization of the bottle 100, a button 90 is pushed down, and then it turns on a lamp 40 for indicating that the bottle 100
15 is in the course of sterilization. Sterilization is carried out by hot water or ultraviolet rays. The hot water is heated by a heater provided under the water tank. The ultraviolet rays are radiated from a lamp provided under the water tank. In this way, after the amount of water and powdered milk is determined, a button 17 is pushed down to operate the automatic milk
20 preparing apparatus.

Of course, a lamp 30 is then turned on to indicate that the automatic milk preparing apparatus is in operation.

This push of the operation button 17 allows the bottle 100 to be moved in the position for receiving water in such a manner that the bottle is
25 reciprocated as if a robotic arm by a means for transferring the milk bottle. The movement of the bottle is schematically shown in Fig. 3. A carrier 170 for carrying the milk bottles is reciprocated along a transferring rail 160 by a motor 190. The milk bottles are stored on one side, for example the right side of the carrier.

30 A heater 220, provided under the water tank 300 as shown in Fig. 2, is

then operated to heat water by selecting a hot water mode. The heated water is inputted into the bottle 100 depending on a certain amount, for example 200ml of water.

As shown in Fig. 2, the automatic milk preparing apparatus is provided with a cover 310 on the top. The water tank 300, placed under the cover 310, is connected with the heater 220. A powdered milk container 210 and a nutrient container 230 are disposed on the left and right sides of the heater 220 so that an amount of powdered milk and nutrient is provided to the bottle. Means for discharging the powdered milk 222 are mounted directly under the powdered milk container 210.

It is noted that whole components which need to be controlled including the heater, means for discharging the powdered milk, means for transferring the bottle, the lamps and the like are controlled by a controller (not shown) which is incorporated into a printed circuit board.

Now, the water tank 300 will be described in detail before describing a process that water is inputted into the bottle. As shown in Fig. 5a, the water tank 300 includes an outlet valve 350 connected to cooperate with the cover 310 with a spring 360 supported between the outlet valve and the cover; and an inlet valve provided in the main water tank 320 for controlling flow rate in cooperation with an auxiliary water tank 370. The inlet valve comprises a control bar 330 supported in the middle, a float fixed on one end of the control bar and a cone 340 fixed on the other end of the control bar 330.

The inlet valve is designed to automatically control the amount of water on the basis of a seesaw principle. In particular, the control bar 330 balanced in the middle by a supporter is provided with a float on one end and with a cone 340 on the other end, so that the float goes down as the cone goes up and vice versa in accordance with the level of water in the main water tank. For example, as the main water tank 320 is increasingly filled with water, the float goes up, and at the same time the cone goes down toward an inlet opening of the auxiliary water tank 370. Therefore, the inlet opening is

gradually closed until the cone goes down completely, and the discharge of water is gradually reduced.

To the contrary, as water is discharged from the main water tank, the water level is lowered. Therefore, the float goes down in proportion to the water level, while the cone goes up. As a result of this, the discharge of water is gradually increased as the inlet opening of the auxiliary water tank is gradually enlarged. In other words, when water pressure is high due to a sufficient amount of water, the inlet opening is narrowed. To the contrary, when water pressure is low due to an insufficient amount of water, the inlet opening is widened. The present invention is adapted to control the water supply on the basis of this principle.

With the water tank according to this principle, when the water tank is filled up to a constant level or higher of water, the water level causes the float to be raised, and the cone 340 to be lowered, and the control bar 330 to be kept horizontal. As a result of this, the inlet opening of the auxiliary water tank 370 is completely closed by the cone of the inlet valve. Water in the auxiliary water tank 370 is provided to the milk bottle by the outlet valve 350. When the cover 310 of the main water tank 320 is closed, the outlet valve 350 is opened to provide water to the milk bottle. To the contrary, when the cover 310 is opened, the outlet valve 350 is closed under action of the spring 360 to prevent the auxiliary water tank from providing water to the milk bottle.

The above water tank structure is adopted to provide a constant amount of water to the milk bottle under a constant pressure whether or not a sufficient amount of water is contained therein.

Fig. 5b shows a variation of the water tank. The water tank shown in Fig. 5b has an inner water tank 385 having a small dimension of outlet 380 on the bottom; and an outer water tank 395 having a large dimension of outlet 390 which is five times of the dimension of the outlet of the inner water tank on the bottom and for housing the inner water tank therein. On beginning to

provide water to the milk bottle, water within a B section is discharged through an outlet 390 of a certain dimension, for example 5.5mm diameter. When this discharge is blocked, water within an A section is passed through a passageway, for example having 0.1mm diameter, to enter into the B section
5 until the B section is sufficiently filled with water. This allows a constant amount of water to be maintained in the water tank because the discharge is dependent on the water pressure of the B section. That is to say, when starting to discharge from the B section, water within the A section is gradually introduced into the B section having little influence on the B section
10 because it is too late for water to be introduced into the B section.

In conclusion, the above methods provide a constant amount of water to the milk bottle under a constant pressure whether or not a sufficient amount of water is contained therein.

If an emergency takes place during operation, an automatic drain
15 valve is operated to drain off water rapidly, which is connected with a drain switch on the rear lower portion of the automatic milk preparing apparatus. Therefore, when the drain switch is pushed down, the water contained in the water tank or the other components flows through the automatic drain valve out of the apparatus.

20 The water determined as above is inputted into the bottle, and then powdered milk is fed into the bottle. This process will be described below. The means for discharging the powdered milk, which are mounted under the powdered milk container as set forth above, function to feed the powdered milk or weaning food from the powdered milk container to the milk bottle.
25 As shown in Fig. 4a, the powdered milk discharging means is so designed that a rotation spoon 110 takes a round in a counterclockwise direction about a rotation axle 130 as a transferring tip 120 performs a reciprocating motion. This drops an amount of powdered milk collected in the transferring tip is fed to the bottle.

30 In detail, when the transferring tip is moved toward the rotation axle

130, an amount of powdered milk is collected from the powdered milk container into a recess of the transferring tip. When the transferring tip is moved away from the rotation axle 130, the collected powdered milk drops freely from the recess of the transferring tip into the bottle.

5 The rotation spoon 110 acts to level the powdered milk, a powdered milk control rib 150 acts to plane the powdered milk contained in the recess of the transferring tip at a constant height. For example, if four spoonfuls of powdered milk are needed, the rotation spoon rotates four times as the transferring tip reciprocates four times. As a result of this, the four
10 spoonfuls of powdered milk are fed into the bottle.

 Fig. 4b shows a powdered milk discharging means different from the aforementioned. The powdered milk discharging means in Fig. 4a are the same as that in Fig. 4b in that the powdered milk drops from the powdered milk container. However, in Fig. 4b, at least one spoon 400 is rotated in a
15 given direction with the powdered milk contained therein, and then as soon as the spoon reaches a discharging section 410, powdered milk contained in the spoon drops into the bottle.

 A space including the discharging section 410 acts as a blocking wall 420 for powdered milk. Powdered milk is prevented from dropping
20 downward the space including the discharging section 410 by the blocking wall.

 In the space other than the blocking wall, the powdered milk drops from the powdered milk container to be received into the spoon 400. The powdered milk container is jointed with the powdered milk discharging
25 means via a connection groove 430.

 There is a different way of feeding the powdered milk to the bottle. As shown in Fig. 4c, if the powdered milk drops from the powdered milk container 210 by vibrating the container with a vibrator 440 to arrive at a given constant amount, the powdered milk is fed into the bottle by a solenoid
30 valve 460.

This is to control the amount of powdered milk in such a manner that the powdered milk container is vibrated at the frequency of once per second to drop down the powdered milk, and the dropped powdered milk is controlled to be input into the bottle by the solenoid valve.

5 Here, the solenoid valve 460 is naturally operated by a solenoid 450. When the powdered milk so much as set by a user is inputted into the bottle, the nutrients which have been set together with the powdered milk nearly at the same time are also inputted into the bottle. For example, the nutrients are inputted into the bottle by an amount ranging from 0.5 to 0.8g.

10 Therefore, the user takes the bottle containing powdered milk, weaning food and/or nutrients out of the automatic milk preparing apparatus only to feed an infant.

According to the present invention, safety approaches are provided. When the bottle is absent from the filling position, a proximity sensor 88
15 mounted under the bottle senses the absence of the bottle to turn on a "None" lamp on the control panel. In addition, when the cover of the water tank is opened, the spring and the discharging valve cooperate to suspend water supply as set forth above.

Further, if the automatic milk preparing apparatus is not used for 30 or
20 more hours, it is no longer operated due to risks of bacterial infection and the like.

That is to say, the automatic milk preparing apparatus is not operated when it is used for a long time. This gives a user a message that the apparatus should be used after being cleaned.

25

Industrial Applicability

As seen from the foregoing, the automatic milk preparing apparatus for bottle-feeding infants according to the present invention can mix a precise amount of milk in a short time. Further, this apparatus can be used for
30 various applications by adding an anion/ozone generator or an air purifier

thereto if necessary. Furthermore, the apparatus can be conveniently used as a supply machine for a variety of coffees, green teas, beverages, juices and the like.

While this invention has been shown and described in connection with the preferred embodiment for illustrating the principle of the present invention, it is to be understood to those skilled in the art that the present invention is not limited to the preferred embodiment and it is possible to do various modifications and variations to the present invention without departing the spirit and scope of the appended claims. Therefore, those appropriate modifications and variations and equivalents should be considered to be within the scope of the present invention.

Claims

1. An automatic milk preparing apparatus, comprising:
a powdered milk container 210, a nutrient container 230 and a water
5 tank 300 housed in a case 301;
powdered milk discharging means 222 placed under the powdered
milk container for supplying the powdered milk contained in the powdered
milk container 210 to a milk bottle 100 into a given amount;
milk bottle transfer means for reciprocating the milk bottle; and
10 a controller for controlling the powdered milk discharging means, and
regulating supply of cold/hot water, the amount of the powdered milk/water
and the like.
2. The automatic milk preparing apparatus according to claim 1,
15 wherein the powdered milk discharging means control the amount of
powdered milk so that the powdered milk is provided to the milk bottle when
a rotation spoon 110 is rotated clockwise or counterclockwise about a rotation
axle 130 to reciprocate a transferring tip 120 which is engaged into the
rotation axle on the side opposite to the rotation spoon.
- 20 3. The automatic milk preparing apparatus according to claim 1,
wherein the powdered milk discharging means comprise a vibrator 440 for
vibrating the powdered milk container; and a solenoid valve 460 for
controlling powdered milk removed from the powdered milk container by the
25 vibrator so that a given amount of powdered milk drops into the milk bottle.
4. The automatic milk preparing apparatus according to claim 1,
wherein the powdered milk discharging means comprises at least one spoon
400 for rotating about an rotation axle to receive the powdered milk dropping
30 from the powdered milk container; a blocking section 420 for blocking the

powdered milk from dropping down into the powdered milk container; a discharging section 410 for dropping the powdered milk contained in the spoon downwards when the spoon is placed under the blocking section.

5 5. The automatic milk preparing apparatus according to claim 4, wherein the at least one spoon consists of two pairs of spoons disposed opposite to each other about the rotation axle.

10 6. The automatic milk preparing apparatus according to claim 1, wherein the water tank comprises: a control bar 330 for regulating flow rate; a feeding valve 340 opposed to the control bar for opening/closing an auxiliary water tank; the auxiliary water tank 370 for dropping water into the milk bottle; an outlet valve 350 for feeding water into the milk bottle; and a spring 360 for indicating operation of the cover 310 to the outlet valve 350.

15 7. The automatic milk preparing apparatus according to claim 6, wherein the water tank is designed to close the inlet valve to suspend water supply into the milk bottle when a float reaches a given water level, and to open the inlet valve to fill the auxiliary water tank with water when the float
20 does not reach the given water level.

 8. The automatic milk preparing apparatus according to claim 6, wherein the spring is designed to suspend water supply to the milk bottle when the cover 310 is opened.

25 9. The automatic milk preparing apparatus according to claim 1, wherein the water tank comprises: an inner water tank 385 having a small dimension of outlet 380 on the bottom; and an outer water tank 395 housing the inner water tank therein and having a large dimension of outlet 390 which
30 is five times the dimension of the outlet of the inner water tank on the bottom.

10. The automatic milk preparing apparatus according to claim 9, wherein the inner water tank causes water to pass through the small dimension of outlet in a constant amount whether or not water is filled sufficiently.

5

11. The automatic milk preparing apparatus according to claim 1, wherein the milk bottle transfer means causes a carrier 170 for carrying the milk bottle to be reciprocated as a robotic arm along a transferring rail by a motor.

10

12. The automatic milk preparing apparatus according to claim 1, wherein the automatic milk preparing apparatus is not operated if it is not used for 30 or more hours.

15

13. The automatic milk preparing apparatus according to claim 1, wherein pushing a sterilization button of the control panel operates an ultraviolet lamp and a heater to carry out sterilization.

20

14. The automatic milk preparing apparatus according to claim 1, wherein a proximity sensor senses the absence of the milk bottle in the filling position to turn on a "None" lamp of the control panel.

25

15. The automatic milk preparing apparatus according to claim 1, wherein a cold and hot water button of the control panel is repeatedly pushed to select either cold water or hot water.

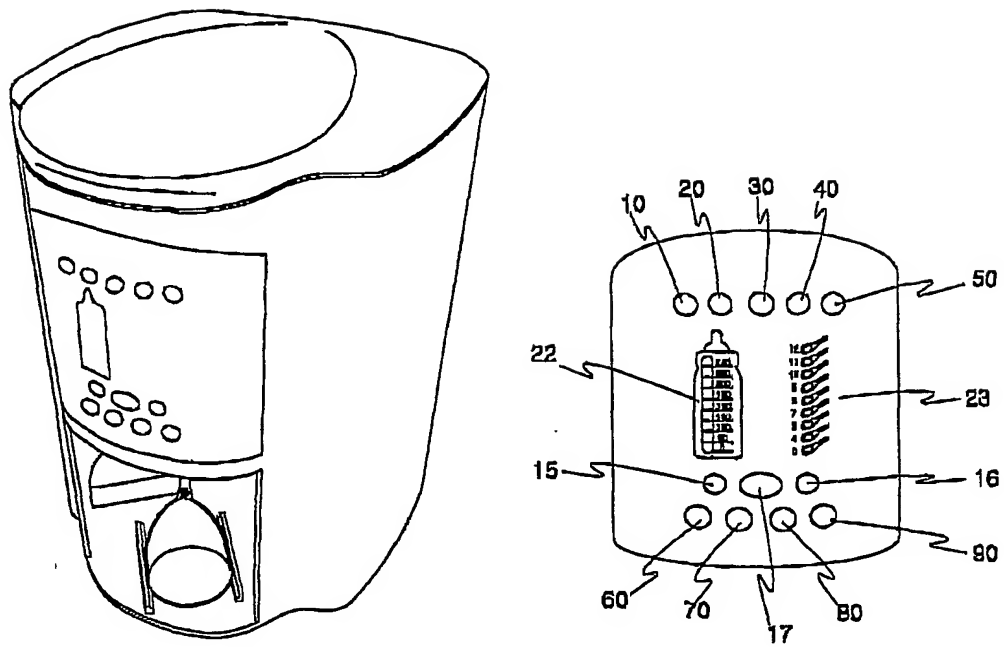
30

16. The automatic milk preparing apparatus according to claim 1, wherein each of the powdered milk container and the nutrient container is filled with coffee, green tea, beverage and the like in place of powdered milk and nutrients.

17. The automatic milk preparing apparatus according to claim 1, further comprising an anion/ozone generator or an air purifier.

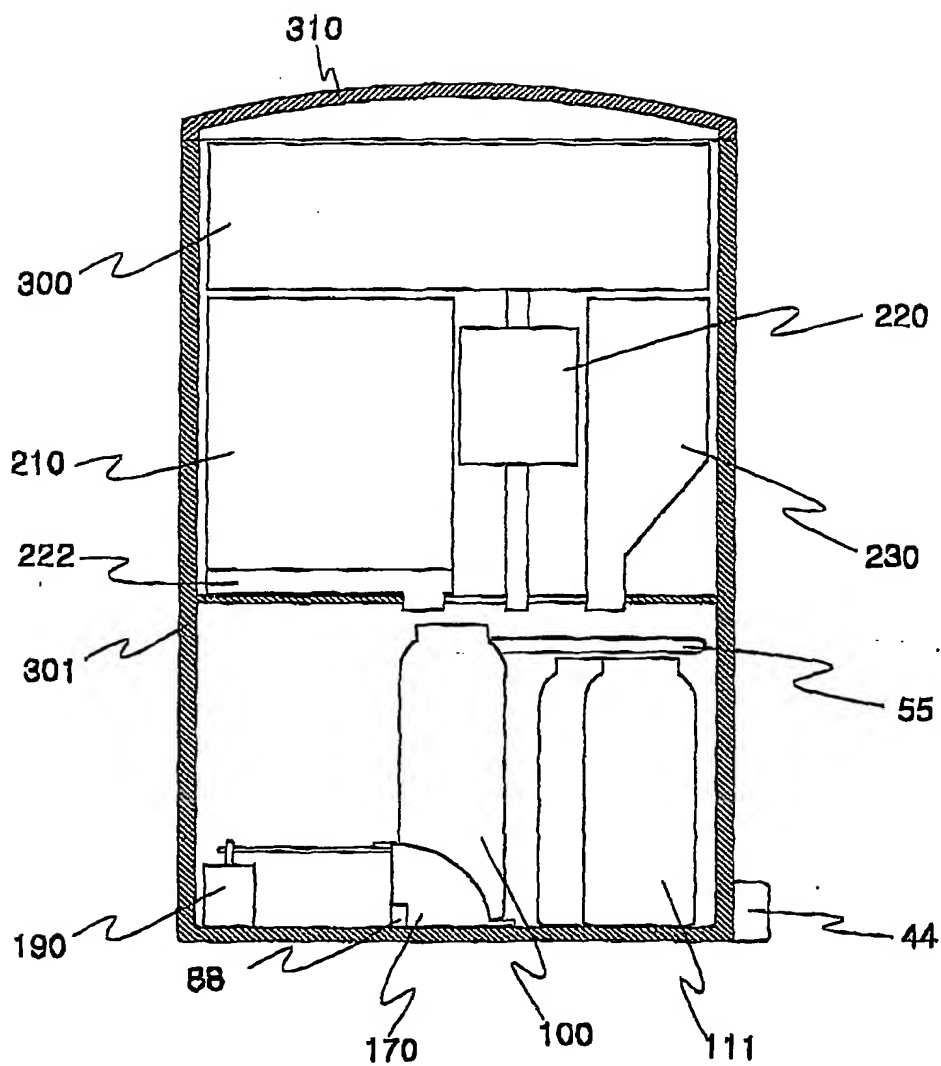
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FIG. 1



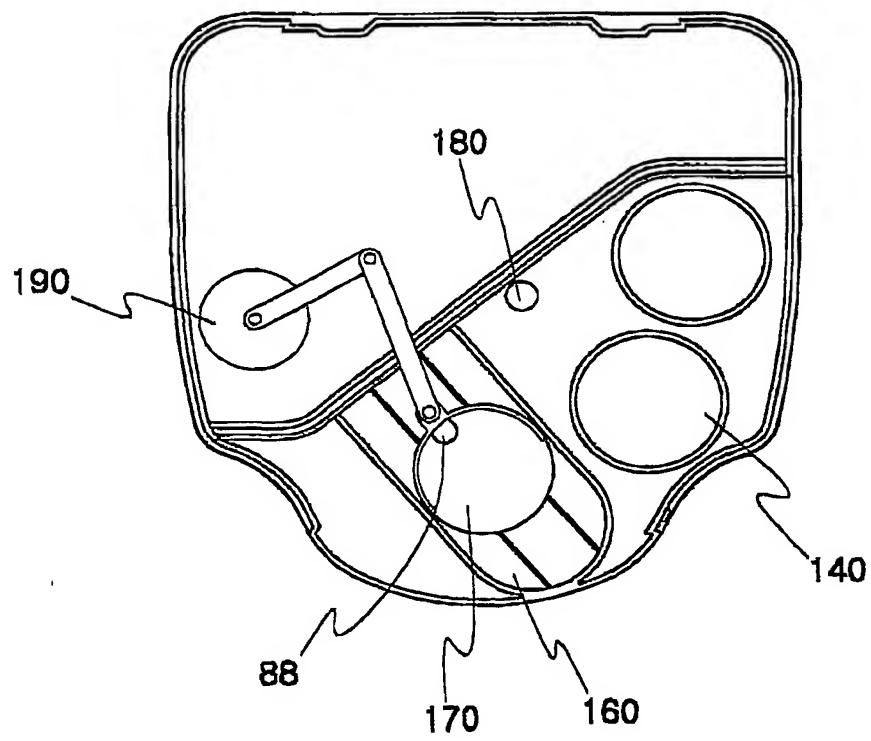
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FIG. 2



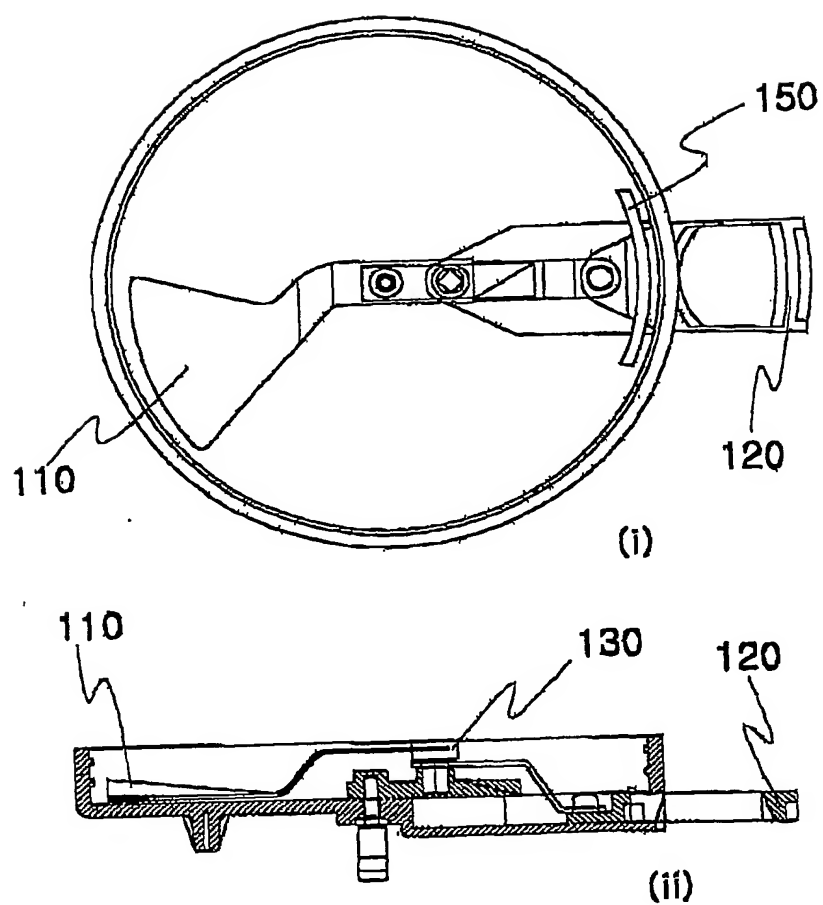
3/7

FIG. 3



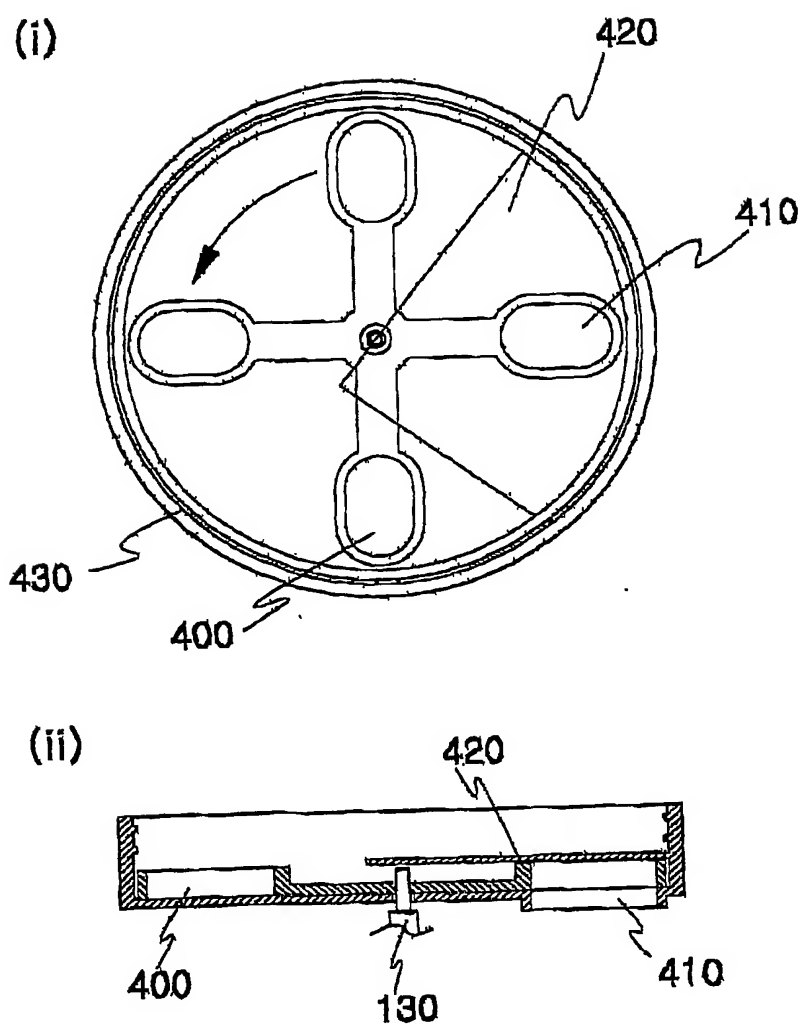
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FIG. 4a



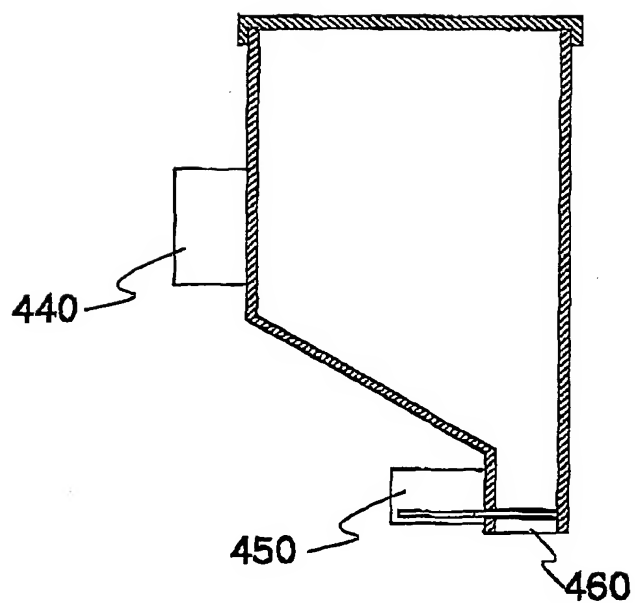
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FIG. 4b



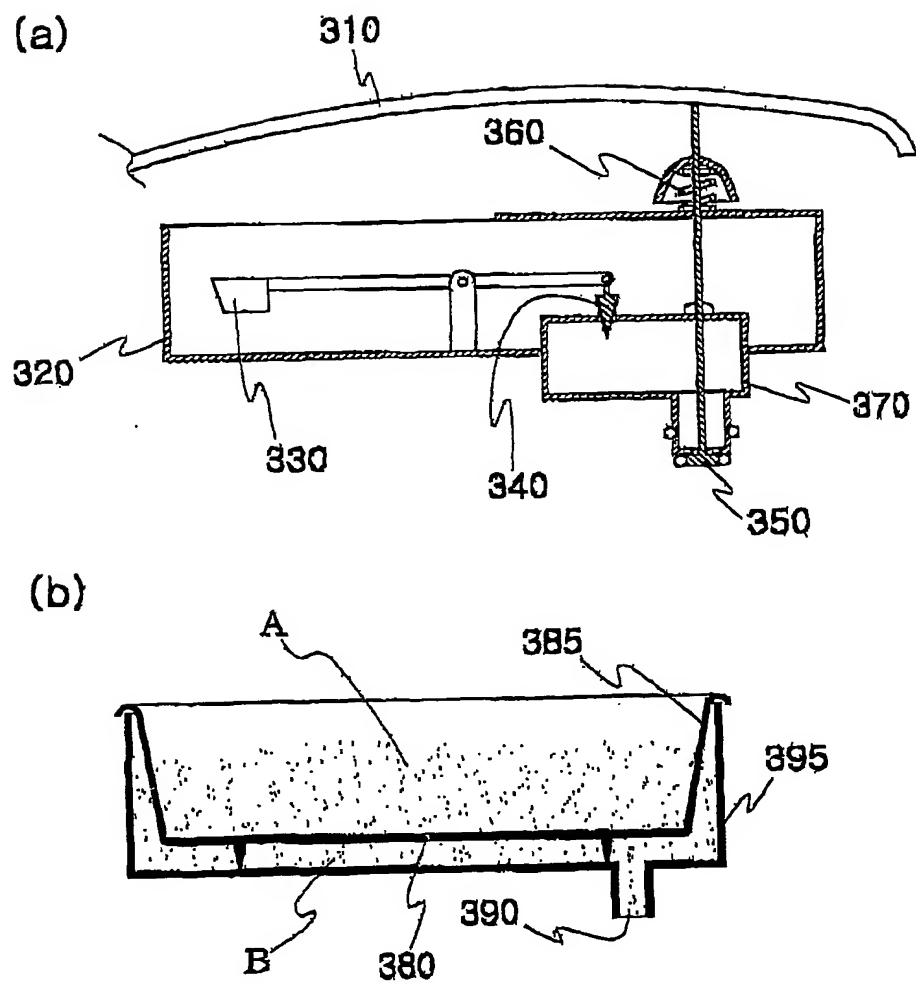
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FIG. 4c



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FIG. 5



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(74) Agent: **LEE, Duck-Rog; YEiL Patent & Trademark Int'l, 2nd FL., YEiL Bldg., 700-19 Yorksam-dong, Kangnam-ku, Seoul 135-918 (KR).**

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CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER**IPC7 A47J 31/40**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47J, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KR, JP as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

KIPASS : "powder", "dried milk", "beverage", "supply", "provide", "machine"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,006,654 A (Jeffrey R. Pugh) Dec.28, 1999 See Figure 1,2 abstract and claims	1,2,4,11
Y	EP 0 843 982 A1 (Bianchi, Roberto Pesenti, Giancarlo) May.27, 1998 See Figure 1 abstract and description	1,2,11
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A	FR 8 807 507 A (GENDRE JEAN PIERRE, PERBER CHANTAL) 1988/05/30 See the entire document	1
A	US 4,694,740 A (Joanny Daloz) Sep.22, 1987 See the whole document	1

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Date of mailing of the international search report

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Information on patent family members

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